Terrestrial Animal Health Standards Commission Report February 2015

REPORT OF THE MEETING OF THE OIE *AD HOC* GROUP ON *SALMONELLA* IN CATTLE

Paris (France), 16–18 December 2014

The OIE *ad hoc* Group on *Salmonella* in cattle (the *ad hoc* Group) met at OIE Headquarters in Paris from 16 to 18 December 2014.

The members of the *ad hoc* Group and other participants are listed at Annex I. The adopted Agenda and Terms of Reference are given at Annex II and Annex III, respectively.

The *ad hoc* Group agreed that the prevention and control of *Salmonella* in cattle will reduce the burden of disease in cattle and the risk of human illness through food-borne contamination, as well as reducing human infections resulting from direct or indirect contact with cattle. The *ad hoc* Group therefore considered that the development of the chapter on the prevention and control of *Salmonella* in commercial cattle production systems was appropriate.

The *ad hoc* Group developed the draft chapter taking into account the draft Chapter 6.X. Prevention and control of *Salmonella* in pig herds. The chapter complements the Codex Alimentarius Commission 'Guidelines for the control of nontyphoidal *Salmonella* spp. in beef meat', currently under development.

The objective of this chapter is to provide recommendations for the reduction of *Salmonella* in cattle in primary production in order to reduce the level of the pathogen (i) entering the slaughterhouse/abattoir (and therefore decrease the risk of beef contamination during slaughter and dressing procedures); (ii) in milk and milk products; and (iii) in the farm environment, thereby reducing the risk of dissemination of *Salmonella* and contact infections in humans.

The *ad hoc* Group acknowledged the diversity of commercial cattle production systems. It also recognised the variable prevalence of *Salmonella* in different cattle populations, the variation in importance of different *Salmonella* serotypes to cattle and human health, and the differing country approaches to the control of *Salmonella* in primary production.

The *ad hoc* Group included an article on definitions for cattle production systems to capture the diversity of cattle production systems, and enable the development of recommendations that take into account of this diversity. These definitions are based on those found in the *Terrestrial Code* Chapter 7.9. Animal welfare and beef cattle production systems.

The recommendations developed for prevention and control of *Salmonella* focus on the major sources and transmission pathways within and between cattle establishments. The generic biosecurity principles incorporated in these recommendations are also likely to assist in the control of other pathogens commonly encountered in commercial cattle production systems.

The *ad hoc* Group developed recommendations for different stages of cattle production, feed and water, intensive to extensive cattle production systems, transport, and lairage. They include generic biosecurity procedures as well as specific *Salmonella* prevention and control measures.

Sampling and testing procedures which may be used for detection of *Salmonella* in cattle were also considered where these are not currently covered in sufficient detail in Chapter 2.9.9. of the *Manual of Diagnostic Tests and Vaccines for Terrestrial Animals*.

The new draft Chapter 6.X. Prevention and control of *Salmonella* in commercial cattle production systems is presented in Annex IV.

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MEETING OF THE OIE *AD HOC* GROUP ON *SALMONELLA* IN CATTLE

Paris (France), 16–18 December 2014

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MEETING OF THE OIE *AD HOC* GROUP ON *SALMONELLA* IN CATTLE

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Adopted agenda

Welcome

1. The OIE standard setting process and work in animal production food safety and relevant Codex Alimentarius standards.

2. Development of a new draft Chapter 6.X. on the prevention and control of *Salmonella* in cattle in order to reduce the burden of disease in cattle and the risks to human health.

3. Preparation of a report for the Code Commission for consideration at its February 2015 meeting.

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Terms of Reference

Purpose of the meeting

To develop a new draft Chapter 6.X. Prevention, detection and control of *Salmonella* in cattle, for Section 6: Veterinary Public Health of the *Terrestrial Animal Health Code*, dealing with the management of this pathogen in cattle to manage risks to human health, taking account of relevant Codex guidelines, and OIE standards.

OIE standard setting work in animal production food safety

The OIE and the Codex Alimentarius (CAC) are two of the three international standard setting organizations recognized under the World Trade Organization (WTO) Agreement on the Application of Sanitary and Phytosanitary Measures (the SPS Agreement). In the context of the SPS Agreement, the OIE is responsible for setting standards in the domain of animal health (including zoonotic diseases) and the CAC in the domain of food safety.

Since 2001, at the request of its Members, the OIE mandate has included setting standards for animal production food safety, i.e. the management of risks arising at the level of the farm through to primary processing. In 2002, the OIE established a Working Group on Animal Production Food Safety with the aim of improving the coordination and harmonisation of standard setting activities of OIE and CAC. The Secretary of Codex and, on an observer basis, the Chair of Codex regularly attend the annual meeting of the Working Group. Through this mechanism and through participation in each other's standard setting procedures, the OIE and CAC collaborate closely in the development of standards relevant to the whole food production continuum, taking care to avoid gaps, duplications and contradictions within and between SPS standards.

***Salmonella* in cattle**

Salmonellosis is one of the most frequently reported food-borne diseases worldwide and cattle meat is considered to be an important source of this food-borne infection.

Since 2010 the APFSWG has been exploring the need for and feasibility of developing OIE standards on the control of *Salmonella* spp. in food producing animals other than poultry (i.e. pigs, cattle, small ruminants) with the purpose of reducing food-borne illness. Based on a recent literature review requested by the APFSWG, 'A review of the scientific literature on the control of *Salmonella* spp. in food producing animals other than poultry' (Simone Belluco *et al.*, in press) and other publications, the APFSWG noted that a) salmonellosis attributed to cattle and pigs is an important cause of illness in humans, b) effective control measures can be implemented at the farm level and, c) Codex is undertaking work in this area.

They recommended that, should the Codex work proceed, the OIE should develop recommendations for the pre-harvest management and control of *Salmonella* spp. in pigs and cattle to complement the Codex guidelines and ensure a whole food chain approach to *Salmonella* risk management in these species.

At the February 2014 meeting of the Terrestrial Animal Health Standards Commission (Code Commission), they agreed that given that the Codex has commenced new work on guidelines for the Control of nontyphoidal

Salmonella spp. in pork and beef meat, the OIE should commence work in this area to complement the Codex work to ensure that standards cover the farm to fork continuum for this pathogen.

In September 2014, the OIE convened an *ad hoc* group to develop a draft chapter on the Prevention and control of *Salmonella* in pig herds. This chapter was reviewed by the Code Commission, at their September 2014 meeting, and circulated to Member Countries for comments as part of their report.

The OIE agreed that work on standard development for *Salmonella* in cattle should follow the work undertaken in pigs.

Relevant considerations

- The OIE has a mandate to develop international standards for animal production food safety, with a primary focus on measures applicable to zoonotic pathogens, for which measures can most effectively be implemented at the animal production level.

- As *Salmonella* in cattle is not an OIE listed disease and the impact on animal health (and direct economic impact) is low, this chapter will be part of Section 6: Veterinary Public Health of the *Terrestrial Code*.

- Standards for zoonotic pathogens at the animal production level should take into account:

    - feasible and cost effective means of controlling the pathogen at the animal level;

    - feasible and cost effective measures for animals and animal products that are internationally traded;

    - existing Codex standards and guidelines of the WHO and FAO.

- The *Terrestrial Code* contains general recommendations on veterinary public health and specific recommendations on controlling Salmonellosis in poultry.

- The OIE *Manual of Diagnostic Tests and Vaccines for Terrestrial Animals* (2014) includes a chapter on for Salmonellosis (Chapter 2.9.9.) which includes recommendations on diagnostic techniques, vaccines and competitive exclusion.

- The format of the new Chapter X.X. should follow the style of existing *Terrestrial Code* chapters.

- The draft *Terrestrial Code* chapter 6.X. on Prevention and control of *Salmonella* in pig herds.

Relevant documents

1. A review of the scientific literature on the control of *Salmonella* spp. in food producing animals other than poultry (Simone Belluco *et al*., in press).

2. The draft *Terrestrial Code* Chapter 6.X. on Prevention and control of *Salmonella* in pig herds.

3. *Terrestrial Animal Health Code* Chapter 6.5. on Prevention, detection and control of *Salmonella* in poultry.

4. *Terrestrial Animal Health Code* Chapter 6.4. on Biosecurity procedures in poultry production.

5. Draft Codex Guidelines for the Control of nontyphoidal *Salmonella* spp. in pork and beef meat (under development).

6. Codex *Guidelines for the Control of* Campylobacter *and* Salmonella *in Chicken Meat* (CAC/GL 78-2011).

Terrestrial Animal Health Standards Commission Report February 2015

DRAFT CHAPTER 6.X.

PREVENTION AND CONTROL OF *SALMONELLA* IN COMMERCIAL CATTLE PRODUCTION SYSTEMS

Article 6.X.1.

Introduction

Nontyphoidal salmonellosis is one of the most common food-borne bacterial diseases in the world with *Salmonella* Enteritidis and *S.* Typhimurium (including monophasic variants) the predominant serotypes identified in most countries. In addition, a limited number of other serotypes associated with cattle may cause salmonellosis in humans, for example *S*. Dublin and *S*. Newport.

As is the case in most food producing *animals*, *Salmonella infection* in cattle is mostly subclinical, although clinical *disease* such as enteritis, septicaemia or abortion can occur. Subclinical *infection* can be of variable duration including a carrier state and can play an important role in the spread of *Salmonella* within and between *herds* and pose a public health risk.

Herd size and stocking density may influence the *risk* of introduction, dissemination or persistence of *Salmonella*; however, this is also dependent on geographical region, husbandry and other factors such as season and age.

Salmonella serotypes and their *prevalence* in cattle may vary considerably between farms, countries and regions. It is important for *Veterinary Authorities* to consider types of *Salmonella*, their occurrence and the *disease* burden in cattle and human populations if developing and implementing strategies for the prevention and control of *Salmonella* in cattle.

Article 6.X.2.

Definitions

Commercial cattle production systems: means those systems where the purpose of the operation includes some or all of the breeding, rearing and management of cattle for the production of *meat* and *meat products* or *milk* and *milk products.*

Intensive cattle production systems: means commercial systems where cattle are in confinement and are fully dependent on humans to provide for basic animal needs such as food, shelter and water on a daily basis.

Extensive cattle production systems: means commercial systems where cattle have the freedom to roam outdoors, and where the cattle have some autonomy over diet selection (through grazing), water consumption and access to shelter.

Semi-intensive cattle production systems: means commercial systems where cattle are exposed to any combination of both intensive and extensive husbandry methods, either simultaneously or variably according to changes in climatic conditions or physiological state of the cattle.

Article 6.X.3.

Purpose and scope

The purpose of this chapter is to provide recommendations for the prevention and control of *Salmonella* in cattle in order to reduce the burden of *disease* in cattle and the *risk* of human illness through food-borne contamination as well as human *infections* resulting from direct or indirect contact with cattle (e.g. via faeces or abortion material).

This chapter applies to cattle (*Bos taurus*, *B. indicus* and *B. grunniens*), water buffaloes (*Bubalus bubalis*) and wood bison (*Bison bison* and *B. bonasus*) kept in commercial cattle production systems.

This chapter should be read in conjunction with the Codex Alimentarius Code of Hygienic Practice for Meat (CAC/RCP 58-2005) and the Codex Alimentarius Code of Hygienic Practice for Milk and Milk Products (CAC/RCP 57-2004).

Article 6.X.4.

Objectives of prevention and control measures

It is recommended that prevention and control be focused on those types of *Salmonella* of greatest consequence to cattle or public health.

Reduction of *Salmonella* in cattle in primary production may reduce the level of the pathogen:

1) entering the *slaughterhouse/abattoir* and therefore decrease the *risk* of beef contamination during *slaughter* and dressing procedures;

2) in *milk* and *milk products*;

3) in the farm environment, thereby reducing the risk of dissemination of *Salmonella* and contact *infections* in humans.

Articles 6.X.5. to 6.X.14. provide recommendations for the prevention and control of *Salmonella* in cattle.

These recommendations may also have beneficial effects on the occurrence of other *infections* and *diseases*.

Article 6.X.5.

Location and design of cattle establishments

When making decisions on the location and design of cattle *establishments,* it is recommended that mitigation of the *risk* of transfer of pathogens, including *Salmonella*, from major sources of contamination be considered. Sources of *Salmonella* may include other livestock *establishments* or areas of application or disposal of contaminated waste or effluent. Transfer of *Salmonella* between *establishments* may involve carriage by wild birds, rodents, flies and other *wildlife*.

It is recommended that the design of intensive cattle systems consider the following:

1) adequate drainage for the site and control of run-off and untreated waste water;

2) use of materials for construction that facilitate effective cleaning and *disinfection*;

3) control of the points of entry;

4) cattle handling and movements to minimise stress and spread of *Salmonella infection*;

5) separation of cattle of different *risk* status;

6) restriction of entry of wild birds, rodents, flies and other relevant *wildlife*.

In extensive cattle production systems, location and design options may be limited; however, applicable biosecurity measures should be considered.

Article 6.X.6.

Biosecurity management plan

Biosecurity measures that include management and physical factors designed to reduce the *risk* of introduction, establishment and spread of animal *diseases*, *infections* or *infestations* to, from and within an animal population would also be expected to assist with the prevention and control of *Salmonella*.

When developing a biosecurity management plan it is recommended that the following be taken into consideration:

1) Veterinary supervision of cattle health.

2) Management of introduction and mixing of cattle.

3) Training of personnel in their responsibilities and their role in animal health, human health and food safety.

4) Maintenance of records including data on cattle health, production, movements, medications, *vaccination*, and mortality, and cleaning and *disinfection* of farm buildings and equipment.

5) Availability of test results to the farm operator when *Salmonella surveillance* is conducted.

6) Removal of unwanted vegetation and debris that could attract or harbour pests around cattle premises .

7) Minimising the entry of wild birds into cattle buildings and feed stores.

8) Cleaning and *disinfection* procedures for buildings in which cattle are handled or housed. For example, the cleaning and *disinfection* procedures for intensive calf housing, calving areas and sick pens after emptying may include feeders, drinkers, floor, walls, aisles, partitions between pens, and

ventilation ducting.

When disinfectants are used they should be applied at an effective concentration after a complementary cleaning procedure.

9) Control of pests such as rodents and arthropods when required and regular assessment of effectiveness.

10) Control of persons and *vehicles* entering the *establishment*.

11) Cleaning and *disinfection* of *vehicles* and equipment identified as a *risk*.

12) Storage and disposal of cattle carcasses, bedding, faeces and other potentially contaminated farm waste in a safe manner to minimise the risk of dissemination of *Salmonella* and to prevent the direct or indirect exposure of humans, livestock and *wildlife* to *Salmonella*. Particular care to be taken when cattle bedding and faeces are used as fertiliser for horticultural crops intended for human consumption.

Article 6.X.7.

Management of cattle introductions

To minimise the *risk* of introducing *Salmonella* through cattle introductions, it is recommended that:

1) There be good communication within the cattle industry to raise awareness of the *risk* of introducing *Salmonella* through cattle introductions.

2) The number of separate sources of cattle for breeding or rearing be kept to as few as possible. For example in a closed dairy *herd* it is possible to introduce new genetic material solely by semen or embryos.

3) If possible, cattle be sourced directly from *herds* of origin because live animal markets or other places where cattle from multiple properties are mixed for resale may increase the risk of spread of *Salmonella* and other *infections* among cattle.

4) Newly introduced cattle be kept separate from the rest of the *herd* for a suitable period before mixing with other cattle, e.g. four weeks.

5) Where appropriate, for example with cattle of unknown status, pooled faecal samples from introduced cattle could be taken to assess their *Salmonella* status.

Article 6.X.8.

On farm cattle management

To minimise the risk of transferring *Salmonella* among cattle, it is recommended that:

1) Cattle with suspected salmonellosis be separated from healthy cattle.

2) Care of healthy cattle be carried out prior to care of cattle with suspected salmonellosis.

3) Priority be given to the hygienic management of calving areas, for example keeping perinatal cattle separated from sick cattle and maintaining a clean environment.

4) When possible, the ‘all-in-all-out’ principle for production cohorts be used. In particular, the mixing of different age groups during rearing of calves should be avoided.

5) Consideration be given to the potential for between-herd transmission of *Salmonella* via rearing and grazing of cattle from multiple sources on a single site, for example shared pasture and heifer rearing.

6) Consideration be given to the potential for between-herd transmission of *Salmonella* through direct contact between cattle across boundary lines or indirectly through contamination of water courses.

Article 6.X.9.

Feed and water

1. Compound feed and feed ingredients

Compound feed and feed ingredients can be sources of *Salmonella infection* for cattle. For the effective control of *Salmonella* it is recommended that:

a) Where appropriate, compound feed and feed ingredients be produced, handled, stored, transported and distributed according to Good Manufacturing Practices, considering Hazard Analysis Critical Control Points (HACCP) principles and recommendations in accordance with Chapter 6.3.

b) Compound feed and feed ingredients be transported and stored in a hygienic manner that minimises access by wild birds, rodents and other *wildlife*.

2. Water

Where there is reason to be concerned about *infection* of cattle with *Salmonella* from contaminated water, measures be taken to evaluate and minimise the *risk*. For example sediment in water troughs may act as a reservoir for contamination.

Article 6.X.10.

Prevention, treatment and control measures

1) *Antimicrobial agents* may modify normal flora in the gut and increase the likelihood of colonisation by *Salmonella*. If *antimicrobial agents* are used, they should be used in accordance with Chapter 6.9.

Antimicrobial agents should not be used to control subclinical *infection* with *Salmonella* in cattle because the effectiveness of the treatment is limited, they may increase the risk of *Salmonella* colonisation, and their use can contribute to the development of antimicrobial resistance.

2) *Vaccination* may be used as part of a *Salmonella* control programme. Vaccine production and use should be in accordance with the *Terrestrial Manual*. The protective effect of vaccines is generally serotype specific and few licensed vaccines are available for cattle.

3) Use of probiotics may reduce colonisation of cattle by *Salmonella* and shedding of *Salmonella;* however, efficacy is variable.

4) Because conditions such as liver fluke and infection with bovine viral diarrhoea virus may increase the susceptibility of cattle to *Salmonella*, control of these conditions is recommended.

5) The immune status of calves is important and therefore care should be taken to ensure that newborn calves consume adequate amounts of high quality colostrum.

Article 6.X.11.

Transportation

The relevant recommendations in Chapter 7.3. apply.

When transporting animals from multiple *establishments,* it is recommended that the *Salmonella* status of the *establishments* be considered to avoid cross-contamination of cattle.

Article 6.X.12.

Lairage

Relevant aspects of *lairage* management include consideration of effective cleaning and *disinfection* between groups, minimising mixing of separate groups and managing stress.

In addition the relevant recommendations in Articles 7.5.1., 7.5.3. and 7.5.4. apply.

Article 6.X.13.

Surveillance in cattle

Surveillance data provide information to assist the *Competent Authorities* in their decision making regarding the requirement for, and design of, control programmes. Sampling and testing methods, frequency and type of samples required should be determined by the *Veterinary Services.*

Standards for diagnostic tests are described in the *Terrestrial Manual*. In addition, other sampling and testing methodologies such as testing of bulk milk or serum samples by ELISA may provide useful information on herd or individual animal status. Boot swab samples from communal areas in cattle housing, slurry samples or lymph nodes collected post-mortem can also be useful for microbiological testing. Some types of *Salmonella* such as *S*. Dublin can be difficult to detect through microbiological methods.

If *vaccination* is used, it may not be possible to distinguish between vaccinated and infected cattle by means of serological testing.

Article 6.X.14.

Prevention and control in low prevalence regions

In regions where *Salmonella infection* of cattle is uncommon, it may be possible to eliminate *infection* from *herds* through a combination of *herd surveillance,* individual testing, movement controls, and possible removal of persistent carriers.

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